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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/870,242	05/30/2001	Jitendra Singh Goela	51048-2 DIV (3568-33-000)	9573

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EXAMINER	
EGAN, BRIAN P	

ART UNIT	PAPER NUMBER
1772	7

DATE MAILED: 06/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 07-01)

Office Action Summary	Application No. 09/870,242	Applicant(s) GOELA ET AL.	
	Examiner Brian P. Egan	Art Unit 1772	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 March 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *27-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *27-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as his invention. The aspect ratio as defined by the Applicant is the ratio of the shell diameter to the thickness of the shell. It is unclear, however, whether the diameter is the inside or outside diameter of the shell. Proper clarification and/or correction are required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 27-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Teverovsky et al. (#6,231,923) in view of Sibley (#5,443,649) and Caputo et al. (#4,895,108).

Teverovsky et al. teach a hollow chemical vapor deposited silicon carbide shell (see Fig. 7). Teverovsky et al. teach that the shell may be any ring part, including disks, rings, spheres, and cylindrical parts (Col. 1, lines 59-63) and thus broadly inclusive of frustroconical shapes as well. The graphite substrates used to form the chemical vapor deposited shells may substantially vary in size with respect to the outside and inside diameter and detail (Col. 2, lines 42-47). The

graphite mandrel substrates are preferably geometrically round and true, but target area shape, size, area distribution, and center of gravity considerations before and after the deposition process, may require variations in shape or offsets in the mounting center (Col. 4, lines 47-51). Thus, the graphite mandrel is adjustable to produce any desired shape (including both cylinders and frustroconical shells). The general design of the disk and ring type substrate tooling configuration provides a total deposition surface area that is approximately equal to or greater than the deposition area of the prior art (Col. 6, lines 18-21). Although Teverovsky et al. fail to explicitly teach a specific aspect ratio or external perimeter, Teverovsky et al. teach, as noted above, that any desired shape may be produced, that the inside and outside diameter can be adjusted, and that the overall dimensions of the substrate are of the same size <u>or greater</u> than the prior art silicone carbide shells (note that the Applicants themselves state that prior art silicone carbide shells were produced up to a size of 18 inch diameters (i.e., @ 60 inch perimeter) (see Applicant's specification, page 14, lines 14-15)). Therefore, it would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to have adjusted the wall thickness as well as the diameter of the silicone carbide shell depending on the desired end product. Furthermore, it would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to have modified the wall thickness and diameter of the silicone carbide shell since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art, *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980), and a change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955). Teverovsky et al. further teach that the rotating shafts and orientation of the substrates parallel to the reactant gas flow promotes a more

uniform rate of deposit over all surface areas, and therefore decreases the CVD cycle time (Col. 2, lines 57-60). The combination of a near net shape part and the uniform deposit thickness also decreases the machining operations needed to achieve a final part (Col. 2, lines 60-62). Therefore, Teverovsky et al. teach away from the buildup of silicone carbide on the CVD apparatus which the Applicant claims to preclude formation of large shells because the buildup causes cracking in the shell. Thus, the ability to modify the size and wall thickness of Teverovsky et al. would not be precluded from any unexpected results obtained by the Applicant's CVD process.

Teverovsky et al. fail to explicitly teach the density of the silicone carbide shell.

Sibley, however, teaches the use of full density silicon carbide shells. Sibley teaches a silicone carbide density of at least 3.18 grams per cubic centimeter (Col. 8, lines 1-2). Sibley teaches the use of a full density silicon carbide for the purpose of providing an advantageous structure where high temperatures and/or corrosive chemicals are present wherein the structure provides high dimensional stability as well as prevents contaminating elements from affecting the process (see Abstract). It would have been obvious through routine experimentation to one of ordinary skill in the art at the time applicants invention was made to have provided a full density silicone carbide material for the purpose of providing an advantageous structure where high temperatures and/or corrosive chemicals are present wherein the structure provides high dimensional stability as well as prevents contaminating elements from affecting the process as taught by Sibley.

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicants invention was made to have modified Teverovsky et al. to include full density silicon

carbide in the silicone carbide shell as taught by Sibley in order to provide an advantageous structure where high temperatures and/or corrosive chemicals are present wherein the structure provides high dimensional stability as well as prevents contaminating elements from affecting the process.

Finally, even if the Applicant contends that the CVD process of Teverovsky et al. is precluded from forming large sized shells with large aspect ratios based on buildup of silicone carbide that causes cracking, both Sibley and Caputo et al. teach CVD processes that form silicone carbide articles wherein specific process steps would preclude buildup of silicone from causing cracks as posited by the Applicant. For example, Sibley teaches that after chemical vapor deposition of the silicone carbide upon a graphite substrate, the substrate may be removed by burning, machining, grinding, grindblasting, and/or dissolving, and that the silicone carbide may be grinded in any areas where more precise dimension is required (see Abstract). Caputo et al. teaches a process step of coating silicone carbide with a coating layer of pyrolytic carbon that enhances the ability of the shell to be removed from the graphite substrate and prevents cracking ("brittle fracture" – Col. 6, lines 19-28). Therefore, Teverovsky et al. may be modified to include any of these aforementioned process steps depending on the desired end product. Thus, for example, Teverovsky et al. may dissolve away the graphite substrate and further grind down the silicone carbide shell such that any buildup would not affect and/or cause cracking in the substrate when forming silicone carbide shells with perimeters greater than 65 inches and aspect ratios exceeding 200.

5. Claims 27-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reagan et al. (#5,154,862) in view of Sibley (#5,443,649) and Caputo et al. (#4,895,108).

Reagan et al. teach a hollow chemical vapor deposited silicon carbide shell (see Abstract). Reagan et al. teach that the shell may be any complex shape ("irregularly shaped articles" – Col. 6, lines 9-14; "tube" – Fig. 2, #60) and thus teaches both cylinders and frustroconically shaped articles. Reagan et al. further teach that codeposited articles produced by the method of the invention amy also have enhanced fracture resistance without any degradation of strength (Col. 7, lines 65-68). Although Reagan et al. fail to explicitly teach a specific aspect ratio or external perimeter, Reagan et al. teach, as noted above, that any desired shape may be produced. Therefore, it would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to have adjusted the wall thickness as well as the diameter of the silicone carbide shell depending on the desired end product. Furthermore, it would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to have modified the wall thickness and diameter of the silicone carbide shell since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art, *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980), and a change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955). Reagan et al. also teach that an annular layer of felt or other flexible material may be included between the mandrel and the carbon paper tube to help maintain desired dimensional restrictions and to facilitate removal of the composite article from the reactor (Col. 4, lines 35-40) and that after codeposition is complete, the tube and composite articles may readily be separated from the mandrel by removing the end cap and sliding the tube along the mandrel – if removal of one or both layers of the carbon tube is also desired, it may then be burned or sand-blasted away from the composite article (Col. 5, lines 35-41). Therefore, Reagan et al. teach

away from the buildup of silicone carbide on the CVD apparatus which the Applicant claims to preclude formation of large shells because the buildup causes cracking in the shell. Thus, the ability to modify the size and wall thickness of Reagan et al. would not be precluded from any unexpected results obtained by the Applicant's CVD process.

Reagan et al. fail to explicitly teach the density of the silicone carbide shell.

Sibley, however, teaches the use of full density silicon carbide shells. Sibley teaches a silicone carbide density of at least 3.18 grams per cubic centimeter (Col. 8, lines 1-2). Sibley teaches the use of a full density silicon carbide for the purpose of providing an advantageous structure where high temperatures and/or corrosive chemicals are present wherein the structure provides high dimensional stability as well as prevents contaminating elements from affecting the process (see Abstract). It would have been obvious through routine experimentation to one of ordinary skill in the art at the time applicants invention was made to have provided a full density silicone carbide material for the purpose of providing an advantageous structure where high temperatures and/or corrosive chemicals are present wherein the structure provides high dimensional stability as well as prevents contaminating elements from affecting the process as taught by Sibley.

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicants invention was made to have modified Reagan et al. to include full density silicon carbide in the silicone carbide shell as taught by Sibley in order to provide an advantageous structure where high temperatures and/or corrosive chemicals are present wherein the structure provides high dimensional stability as well as prevents contaminating elements from affecting the process.

Finally, even if the Applicant contends that the CVD process of Reagan et al. is precluded from forming large sized shells with large aspect ratios based on buildup of silicone carbide that causes cracking, both Sibley and Caputo et al. teach CVD processes that form silicone carbide articles wherein specific process steps would preclude buildup of silicone from causing cracks as posited by the Applicant. For example, Sibley teaches that after chemical vapor deposition of the silicone carbide upon a graphite substrate, the substrate may be removed by burning, machining, grinding, grindblasting, and/or dissolving, and that the silicone carbide may be grinded in any areas where more precise dimension is required (see Abstract). Caputo et al. teaches a process step of coating silicone carbide with a coating layer of pyrolytic carbon that enhances the ability of the shell to be removed from the graphite substrate and prevents cracking ("brittle fracture" – Col. 6, lines 19-28). Therefore, Teverovsky et al. may be modified to include any of these aforementioned process steps depending on the desired end product. Thus, for example, Teverovsky et al. may dissolve away the graphite substrate and further grind down the silicone carbide shell such that any buildup would not affect and/or cause cracking in the substrate when forming silicone carbide shells with perimeters greater than 65 inches and aspect ratios exceeding 200.

Response to Remarks

6. Applicant's arguments with respect to claims 27-34 have been considered but are moot in view of the new ground(s) of rejection.

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian P. Egan whose telephone number is 703-305-3144. The examiner can normally be reached on M-F, 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Y. Pyon can be reached on 703-308-4251. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Brian P Egan
6/14/03

HAROLD PYON
SUPERVISORY PATENT EXAMINER
1772
6/16/03